

SIZE OF ECONOMY EFFECTS FOR INTERNATIONAL TRADE IN THE EU

ЕФЕКТИ ВЕЛИЧИНИ ЕКОНОМІКИ ДЛЯ МІЖНАРОДНОЇ ТОРГІВЛІ В ЄС

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Abstract. *The difference in export strategies of small and large economies is based on different sensitivity of various industries to the economies of scale effect. The paper aims at analyzing the impact of economy size on the structure of merchandise exports of the EU member states and other advanced economies. Additionally the effects of income level and economic integration are estimated. Correlation, regression and cluster analysis were used as methods of research.*

Specialization in exports of most components of food industry and agriculture is widespread among small and less developed economies outside the EU. Exports of fuels and energy are also more typical to small and less integrated economies. Textile and apparel industry is relatively more important for economies with cheaper labor. Exports of ores and metals and creative products do not depend on home market and income level effects. Competitive advantages in most of these industries determine the export structure of Ukraine as a middle income medium-size economy.

Most advanced economies obviously dominate in exports of chemical and high technology industries. Engineering is a very diverse industry. Its components either do not depend on home market effect (production of most types of vehicles, instruments and apparatus) or depend on existence of large domestic market and / or membership in the economic union (electric and electronic devices, automobiles, industrial equipment). It is also important to have access to large market of economic union for production of furniture, toys and games. The latter two industries as well as medium technology engineering may receive additional impetus for development under scenario of accession of Ukraine to the EU.

Key words: *size of economy, international trade, economic integration, European Union, economies of scale, income level.*

Анотація. *Різниця в експортних стратегіях малих і великих економік базується на різній чутливості галузей до ефекту масштабу. Метою дослідження є аналіз впливу величини економіки на структуру товарного експорту країн ЄС та інших розвинених країн. Додатково аналізується вплив рівня доходу та економічної інтеграції. Дослідження проведене методами регресійно-кореляційного та кластерного аналізу.*

Спеціалізація на експорті більшості видів продукції агропромислового сектору більше характерна для малих менш заможних економік за межами ЄС. Експорт продукції паливно-енергетичного комплексу також притаманний малим неінтегрованим економікам. А легка промисловість відносно важливіша також для економік з дешевою працею. Експорт продукції металургічного комплексу та креативної індустрії (крім іграшок та ігор) не залежить від ефектів масштабу чи рівня розвитку. Конкурентні

переваги у більшості з цих галузей лежать в основі експорту України як економіки середньої величини і з середнім рівнем доходів.

У експорті продукції хімічної промисловості та високотехнологічних галузях явно домінують найбільш високорозвинені економіки. Машинобудування за своєю природою є дуже дифференційованою галуззю, окремі компоненти якого або не залежать від ефекту масштабу (транспортні засоби крім автомобілів, прилади) або сильно залежать від наявності ємного внутрішнього ринку та/або входження до економічного союзу (важке, електронне та електричне, автомобільне). Так само важливий доступ до ємного ринку економічного союзу для меблевої промисловості та виробництва іграшок та ігор. Останні дві галузі як і середньотехнологічне машинобудування можуть одержати додатковий поштовх для розвитку у разі інтеграції України в ЄС.

Ключові слова: величина економіки, міжнародна торгівля, економічна інтеграція, Європейський Союз, ефект масштабу, рівень доходів.

Introduction. Industrial structure of production and exports of a country depends on availability of natural resources, costs and skills of labor, government policy, economic openness, economies of scale and other factors. Under close economy large size of domestic market is an important precondition for development of industries with economies of scale. But under global or regional trade integration entering foreign markets may offset small size of internal market of a country. Nevertheless incompleteness of integration, especially at the global level, helps large economies to have natural competitive advantages in several industries. Establishment of the single market within the EU economic union has created unique preconditions for convergence of export structures of small and large member states. Analyzing sensitivity of industries to the exporting country size, as well as to the income level in it as a control variable, may be useful for elaboration of export strategies of small and large economies both inside and outside the economic union. The research results may also be useful for Ukraine, which is a middle income and medium-size economy with a growing level of integration with the EU.

The purpose of research is to estimate the effect of economy size on the product structure of exports considering economic integration and income level.

Previous literature review. Most of the studies about country size effects consider one or several dimensions: GDP, population and territory, which are related to three types of resources: human, land and capital. These dimensions are not perfect substitutes of each other. In a sample of 72 countries correlation between population and territory area was 0.58, between GDP and territory size – 0.32, between GDP and population – 0.23 (Panahi, 2010).

Models based on economies of scale envisage that countries with large domestic market are more competitive. This creates a home market effect which is especially strong under situation of monopoly or oligopoly (Hummels, 2006). According to Hanson & Xiang (2002), industries with high transportation costs and low elasticity for substitution (under higher differentiation of products) tend to concentrate in larger countries by GDP.

Lee & Zhang (2019) noted that small economies have a less diversified export structure. Cieślak & Parteka (2021) also concluded that smaller size of a country in comparison to the rest of the world decreases export diversification.

Perkins & Syrquin (1989) wrote that large countries are more specialized in exports of products of manufacturing, while mineral products are more important in exports of small countries. Perry (2001) estimated that small states rely more on low technology industries. Tiits (2007) noted that small countries are unlikely to specialize in new industries as they have to buy most of the technologies from abroad.

On the other hand, Braunerhjelm & Thulin (2006) have not found evidence that country size affects exports of high technology products. A possible explanation is that knowledge may be very specialized, which allows its high localization, and economies of scales can exist even in small countries thanks to foreign direct investments and trade liberalization. Small countries can

specialize in certain market segments and stages of high technology production. Fagerberg (1995) analyzed OECD countries to find the industries where large home market is important for competitiveness: production of aircrafts, computers, semiconductors, household appliances, energy generating equipment and cars, i.e. industries with high non-tariff barriers. The effect is not observed in the rest of high technology industries. The latter can be suitable for specialization of small countries.

Vujakovic (2009) wrote that countries with smaller territory are more open to services trade and more often rely on international tourism. Brau, Lanza & Pigliaru (2006) estimated that among 14 out of 17 heavily dependent on tourism countries were small and half out of 29 small states substantially depended on tourism. But Lanza & Pigliaru (1999) had noted that availability of natural resources is a more important factor for tourism specialization than small country size. Specialization in financial services could also be advantageous for small states because this sector can generate large value added based on human capital and in this case economies of scales do not depend on the size of a national market (Brandi, 2004).

Thus, the previous studies mostly avoid analysis of the impact of economy size of a detailed structure of a country exports. Instead, they usually focus on monopoly power, exports diversification, technological structure of merchandise exports or the role of specific services.

Methodology. Our sample includes 50 countries with the per capita income similar to the level in the EU member states (above 20 000 dollars by purchasing power parity (PPP) method). Two types of countries were excluded from the sample: very small countries and territories and countries which are heavily dependent on fuel exports (more than 40% of merchandise exports) because here the main factor is availability of fossil fuel reserves). The time period is 2020.

Dependent variables are the shares of the relevant product groups in the total merchandise exports of a country, in % (data from UNCTAD (2022)). The independent variables (data from World Bank (2021)) include:

- GDP in dollars (PPP method) as a measure of home market size – GDP;
- GDP per capita in dollars (PPP method) as a measure of income level – GDPpc;
- total population in number of persons – Pop;
- land area in square kilometres – Area;
- membership in the EU, a Boolean variable (1– yes, 0 – no).

Correlation analysis shows that higher correlations are usually with natural logarithms of independent variables. Therefore all the independent variables (except the Boolean variable) are taken in logs. Country size dimensions are positively correlated. The correlation between GDP and total population is 0.98. Thus, in order to avoid multicollinearity, we excluded total population from our further analysis.

At the next stage cluster analysis (K-means method) is used to classify industries. The data used includes correlations with the relevant factors.

Finally, regression analysis enabled to create several models of export structure. Robustness of results was checked by recalculation of the regression models without outliers.

Results. Table 1 shows the estimated correlations between product export shares and the analyzed factors. There is an obvious exception: correlation of ores and metals share with absolute GDP per capita is higher (0.36) than with logarithm of it (0.27), so the relationship seems to be linear.

The preliminary analysis shows that income level and economy size affect almost half of the 43 product groups; land area – at most 1/6 of the groups; membership in the economic union – about 40% of industries. About 1/7 industries turned out to be independent from these factors.

Table 1

Correlation between product export shares and factors

Product group	lnGDPpc	lnGDP	lnArea	EU	Cluster
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Primary products	-0.30	-0.24	0.25	-0.43	1
Resource-based manufactures: agro-based	-0.41	-0.54	-0.21	-0.07	2
Resource-based manufactures: other	0.03	-0.19	-0.13	-0.15	4
Low technology manufactures: textile, garment and footwear	-0.31	-0.02	-0.10	0.06	5
Low technology manufactures: other products	0.15	0.13	-0.05	0.52	3
Medium technology manufactures: automotive	0.03	0.39	0.26	0.36	6
Medium technology manufactures: process	0.15	0.30	0.05	0.13	3
Medium technology manufactures: engineering	0.15	0.12	-0.12	0.31	3
High technology manufactures: electronic and electrical	0.24	0.25	-0.17	0.05	3
High technology manufactures: other	0.47	0.13	-0.16	0.23	3
Agricultural raw materials	-0.26	-0.21	0.15	-0.08	1
Animal and vegetable oils, fats and waxes	-0.34	0.04	0.24	-0.20	1
Food and live animals	-0.36	-0.42	-0.07	-0.35	2
Beverages and tobacco	-0.22	-0.21	-0.03	0.16	5
Mineral fuels, lubricants and related materials	-0.15	-0.31	-0.22	-0.11	2
Electric current	-0.30	-0.42	-0.16	-0.18	2
Ores and metals (except iron and steel)	-0.08	-0.09	0.24	-0.27	1
Manufactured goods	0.36	0.37	-0.11	0.49	6
Iron and steel	0.27	0.06	-0.05	0.26	3
Chemicals and related products, n.e.s.	0.44	0.15	-0.12	0.17	3
Medicinal and pharmaceutical products	0.39	0.05	-0.15	0.26	3
Essential oils for perfume materials and cleaning preparations	0.29	0.30	0.03	0.19	3
Machinery and transport equipment	0.24	0.37	-0.02	0.35	6
Power generating machinery and equipment	0.34	0.49	0.18	0.27	6
Specialized machinery	0.43	0.41	0.05	0.20	6
Metal working machinery	0.31	0.46	0.14	0.13	6
Other industrial machinery and parts	0.34	0.40	0.13	0.53	6
Office machines and automatic data processing machines	0.23	0.34	0.01	0.10	3
Telecommunication and sound recording apparatus	-0.01	0.01	-0.04	0.34	5
Electrical machinery, apparatus and appliances, n.e.s.	0.17	0.25	-0.18	0.03	3
Railway vehicles & associated equipment	-0.15	0.02	0.07	0.22	5
Aircraft & associated equipment; spacecraft, etc.	0.16	0.08	-0.10	-0.09	4
Ships, boats & floating structures	-0.07	-0.33	-0.25	-0.03	2
Furniture and parts thereof	-0.15	0.05	0.12	0.43	5
Articles of apparel & clothing accessories	-0.32	-0.05	-0.11	-0.02	5
Professional and scientific instruments, n.e.s.	0.02	0.10	-0.06	-0.13	4
Photo apparatus, optical goods, watches and clocks	0.26	0.15	-0.13	-0.19	4
Cinematograph films, exposed & developed	-0.09	-0.04	0.00	0.07	5
Arms & ammunition	-0.04	0.05	-0.02	-0.17	4
Printed matter	-0.01	-0.19	-0.36	0.24	5

Baby carriages, toys, games & sporting goods	-0.04	-0.10	-0.26	0.38	5
Works of art, collectors' pieces & antiques	0.20	0.24	0.09	-0.23	4
Jewelry & articles of precious materials, n.e.s.	0.05	0.14	-0.05	-0.38	4

Note: correlation >0,24 significant at $p<0,10$; >0,28 – at $p<0,05$; >0,36 – at $p<0,01$.

Results of the cluster analysis are shown in tables 1 and 2. F-test proved significant contribution of all the four factors to grouping industries ($p<0,01$).

Table 2

Average correlations in clusters of industries

Factor / cluster	1	2	3	4	5	6
lnGDPpc	-0.25	-0.26	0.27	0.10	-0.14	0.29
lnGDP	-0.12	-0.41	0.19	0.08	-0.06	0.41
lnArea	0.22	-0.18	-0.08	-0.06	-0.08	0.09
EU	-0.25	-0.15	0.20	-0.19	0.21	0.33

The industries within cluster 1 (mostly primary production) develop more actively in countries with relatively lower income, smaller territory and outside the EU. Industries of cluster 2 (agriculture, energy sector and ship-building) – in smaller countries with lower income. Cluster 3 industries (mostly medium and high technology manufactures, iron and steel industry, chemical industry) – in richer countries and sometimes in larger countries or in economic union member states. Cluster 4 sectors (some high technology industries, jewelry, works of art etc.) tend to be independent from the four analyzed factors. Cluster 5 industries (textile and apparel industry, production of telecommunication equipment, furniture and creative products etc.) also do not significantly depend on income and country size, but sometimes are more concentrated in the EU. Economies of scale based on market size are the most relevant for the cluster 6 sectors (production of industrial equipment and cars). Thus they require substantial efficient demand in domestic economy or at least within an economic union.

Regression analysis results are shown in tables 3 and 4 if they are robust enough. The effect of land area size is insignificant for all the industries. Several effects failed to be proved during robustness check by excluding outliers. E.g. the effect of income level is not robust for low technology production (without outlier – Mauritius), agricultural raw materials (Uruguay), iron and steel (Luxemburg), photo apparatus, optical goods, watches and clocks (Switzerland). The same happened to the effect of the EU membership and land area size for ores and base metals (Chile). Economy size effect is not robust for ships (Cyprus and the Bahamas) and works of arts (United Kingdom). The effect of land area size is not significant for printed matter (Malta).

Table 3

Regression models for technological structure of exports

Product group	b ₀	b ₁ (lnGDP pc)	b ₂ (lnGDP)	b ₃ (EU)	R ²	p-value for F- test
Primary products	22,6*** (3,0)			- 13,4*** (4,1)	0,18	0,002
Resource-based manufactures: agro-based	109,9** * (23,0)	-4,59** (2,23)	-1,88*** (0,51)		0,35	0,000
Low technology manufactures: other products	5,58*** (0,85)			4,81*** (1,15)	0,27	0,000
Medium technology manufactures: automotive	-35,6*** (12,7)		1,49*** (0,48)	4,87*** (1,71)	0,28	0,000
Medium technology manufactures: process	-9,77 (7,48)		0,62** (0,28)		0,09	0,032
Medium technology manufactures: engineering	11,6*** (1,55)			4,69** (2,11)	0,09	0,031
High technology manufactures: electronic and electrical (without Malaysia)	-58,8** (26,8)	6,32** (2,53)			0,12	0,016
High technology manufactures: other	-79,7*** (24,5)	8,27*** (2,31)			0,21	0,001
High technology manufactures: other (without Ireland)	-51,5** (21,3)	5,56*** (2,02)			0,14	0,008

Note: in tables 3-4 significance according to t-test: *** – p<0.01, ** – p<0.05, * – p<0.1. Standard errors are in brackets.

Table 4

Regression models for industrial structure of exports

Product group	b ₀	b ₁ (lnGDP pc)	b ₂ (lnGDP)	b ₃ (EU)	R ²	p-value for F- test
Animal and vegetable oils, fats and waxes	13,37** * (4,98)	-1,19** (0,47)			0,12	0,015
Animal and vegetable oils, fats and waxes (without Argentina and Malaysia)	4,88** (1,97)	-0,41** (0,19)			0,10	0,032
Food and live animals (without New Zealand)	178,8** * (45,5)	-7,84* (4,51)	-2,95*** (1,00)	-7,48** (3,53)	0,35	0,000
Mineral fuels, lubricants and related materials (without Malta)	26,92** (12,24)		-0,79* (0,46)		0,06	0,093
Electric current	16,9*** (5,7)		-0,61*** (0,21)		0,18	0,007

Electric current (without Montenegro)	3,09*** (1,0)		-0,10** (0,04)		0,15	0,015
Manufactured goods	-77,7* (40,1)		4,84*** (1,51)	22,63** * (5,40)	0,37	0,000
Chemicals and related products, n.e.s.	- 109,6** * (36,3)	11,7*** (3,43)			0,20	0,001
Chemicals and related products, n.e.s.(without Ireland)	-59,7** (29,6)	6,89** (2,80)			0,11	0,018
Medicinal and pharmaceutical products	-65,6*** (24,0)	6,74*** (2,26)			0,16	0,005
Medicinal and pharmaceutical products (without Ireland)	-36,1*** (20,8)	3,89*** (1,97)			0,08	0,054
Essential oils for perfume materials and cleaning preparations	-3,14 (2,00)	0,17** (0,076)			0,09	0,033
Machinery and transport equipment	-65,9** (30,4)		3,33*** (1,14)	11,2*** (4,1)	0,25	0,001
Power generating machinery and equipment	-10,9*** (3,0)		0,46*** (0,11)	0,88** (0,41)	0,31	0,000
Specialized machinery	-21,3*** (6,0)	1,48** (0,58)	0,30** (0,13)		0,27	0,001
Metal working machinery	-1,67*** (0,54)		0,073** * (0,020)		0,21	0,001
Other industrial machinery and parts	-10,7*** (3,6)		0,49*** (0,13)	2,33*** (0,48)	0,44	0,000
Office machines and automatic data processing machines	-8,21** (3,96)		0,37** (0,15)		0,12	0,016
Telecommunication and sound recording apparatus	1,23** (0,49)			1,66** (0,67)	0,11	0,016
Electrical machinery, apparatus and appliances, n.e.s.	-19,3 (14,8)		0,99* (0,56)		0,06	0,082
Furniture and parts thereof	0,48* (0,26)			1,17*** (0,36)	0,18	0,002
Articles of apparel & clothing accessories	31,0** (12,2)	-2,73** (1,15)			0,11	0,021
Articles of apparel & clothing accessories (without Mauritius)	14,7** (7,3)	-1,23* (0,69)			0,06	0,080
Baby carriages, toys, games & sporting goods	0,23* (0,12)			0,47*** (0,17)	0,14	0,006
Jewelry & articles of precious materials, n.e.s.	0,59*** (0,11)			- 0,42*** (0,15)	0,14	0,008

Thus, no significant effect was found for the effects of income level, economy size and deep economic integration for exports of agricultural raw materials, beverages and tobacco, ores and

metals, vehicles (except cars), professional and scientific instruments, photo and optical goods, clocks and watches, cinematograph films, printed matter, arms and ammunition, and works of art and similar products (1st group). In some cases it is counterintuitive (mainly in case of engineering) as it does not fit the theoretical assumptions about economies of scales and influence of highly paid skilled labor. A possible explanation is global economic integration (which decreased importance of a large domestic market) and development of technical education in middle income economies. Orientation towards this product groups can be useful for various types of economies at least among the relatively advanced economies (approximately upper tercile / quartile).

The 2nd group includes industries that are dominant in relatively less developed economies (with cheaper labor): agriculture, food industry, textile and apparel industry.

The 3rd group consists of sectors which are widespread in countries with smaller domestic market and / or are outside an economic union: also agriculture, food industry as well as energy sector and jewelry industry. Economies of scale are less or not important for such industries.

The 4th group includes sectors with competitive advantage in the richest economies: high technology industry in general, chemical industry (including pharmaceutical and perfumery) and production of specialized machinery.

The 5th group consists of industries with importance of market size and includes three subgroups of industries for which:

- large domestic market is important and deep economic integration is unable to offset its absence: production of specialized machinery, metal working machinery, office machines and automatic data processing machines, various other types of electrical appliances and manufacturing in general (other than engineering);
- large domestic market is important but its absence can be compensated with deep economic integration: manufacturing in general, engineering in general, automotive industry, production of power generating and various other industrial machinery;
- large domestic market is not necessary, while barrier-free access to the market of a large economic union is more important: non-agricultural low technology production, medium technology engineering, production of telecommunication and sound recording apparatus, furniture, special products for children, games and sports.

It is possible to extrapolate the results to Ukraine, although with the reservation that it is a middle-income economy unlike more advanced economies in our sample. According to our results, three categories can be distinguished:

1. Currently the most competitive industries for Ukraine may include those from the 1st and the 2nd groups: agriculture, food, textile and apparel, metallurgy, creative industries and production of some types of vehicles and instruments.

2. Under a scenario of accession to the EU several sectors may become more competitive in Ukraine: production of automobiles, some types of industrial and electronic equipment, furniture and toys.

3. Least competitive industries in Ukraine now and in the near decades are (considering insufficient development level and market size): most high technology industries, chemical and pharmaceutical industry, production of some other types of industrial and electronic equipment.

Conclusion. The paper analyzed a sample of countries including the EU member states and other countries with similar development level. Correlation and cluster analysis were used for preliminary selection of factors and grouping of industries. No significant effect of land area on export structure was found. The effect of population size cannot be distinguished from the impact of economy size at least in the sample of relatively developed economies. Some industries depend on three possible factors: domestic market size (GDP), deep economic integration within an economic union (membership in the EU) and the control variable – income level (GDP per capita). The relationships are nonlinear (logarithmic). Nevertheless regression analysis has failed to prove some of the effects after considering control variables or excluding outliers from the sample. The remaining robust results are mentioned below.

Specialization in exports of most components of food industry and agriculture is widespread among small and less developed economies outside the EU. Exports of fuels and energy are also more typical to small and less integrated economies. Textile and apparel industry is relatively more important for economies with cheaper labor. Exports of ores and metals and creative products (except toys and games) do not depend on home market and income level effects. Competitive advantages in most of these industries determine the export structure of Ukraine as a middle income medium-size economy.

Most advanced economies obviously dominate in exports of chemical and high-technology industries. Engineering is a very diverse industry. Its components either do not depend on home market effect (production of most types of vehicles, instruments and apparatus) or depend on existence of large domestic market and / or membership in the economic union (electric and electronic devices, automobiles, industrial equipment). It is also important to have access to large market of economic union for production of furniture, toys and games. The latter two industries as well as medium-technology engineering may receive additional impetus for development under scenario of accession of Ukraine to the EU.

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References

1. Brandi, L. (2004). The economy of small states. *Rivista di Politica Economica*, 94(6), 145-173. <http://www.rivistapoliticaeconomica.it/2004/nov-dic/BrandiING.pdf>
2. Brau, R., Lanza, A., & Pigliaru, F. (2006). *How fast are small tourist countries growing? The 1980–2003 evidence* (Working paper No. 2006/14). Centro Ricerche Economiche Nord Sud, Università di Cagliari, Università di Sassari. <https://crenos.unica.it/crenos/sites/default/files/wp/06-14.pdf>
3. Braunerhjelm, P., & Thulin, P. (2006). *Can countries create comparative advantages? R&D-expenditures, high-tech exports and country size in 19 OECD-countries, 1981–1999* (CESIS Electronic Working Paper No. 61). The Royal Institute of technology, Centre of Excellence for Studies in Science and Innovation. https://www.researchgate.net/profile/Per-Thulin/publication/24082072_Can_countries_create_comparative_advantages_RD_expenditures_high-tech_exports_and_country_size_in_19_OECD_countries_1981-1999/links/0deec525799402984a000000/Can-countries-create-comparative-advantages-R-D-expenditures-high-tech-exports-and-country-size-in-19-OECD-countries-1981-1999.pdf
4. Ciešlik, A., & Parteka, A. (2021). Relative productivity, country size and export diversification. *Structural Change and Economic Dynamics*, Elsevier, 57(C), 28-44. <https://reader.elsevier.com/reader/sd/pii/S0954349X21000023?token=1F778FC5539A16375366D54585EE71C5FBBC813B8E66D15B0BFB9C47614D71E223A4D1A153B5D8BF670EABFACE47F048&originRegion=eu-west-1&originCreation=20220325112354>
5. Fagerberg, J. (1995). *Is there a large-country advantage in high-tech?* (Working Paper No. 525). Norwegian Institute of International Affairs, 1995. https://www.researchgate.net/profile/Jan-Fagerberg-2/publication/23546914_Is_there_a_large-country_advantage_in_high-tech/links/54038ccb0cf2bba34c1c24ad/Is-there-a-large-country-advantage-in-high-tech.pdf
6. Hanson, G. H., & Xiang, C. (2002). *The home market effect and bilateral trade patterns* (Working Paper № 9076). National Bureau of Economic Research, 2002. DOI: 10.3386/w9076
7. Hummels, D. (2006). *The role of geography and size* (Occasional Paper No. 35). American Development Bank, Integration and Regional Programs Department, Institute for the Integration of Latin America and the Caribbean IDB-INTAL, Integration Trade, and Hemispheric Issues Department. <https://www.researchgate.net/profile/David->

Hummels/publication/46443528_The_role_of_geography_and_size/links/0a85e53be6fa9aeef100000/The-role-of-geography-and-size.pdf

8. Lanza, A., & Pigliaru F. (1999). *Why are tourism countries small and fast-growing?* (Working Paper No. 199906). Centre for North South Economic Research, University of Cagliari and Sassari, Sardinia. <https://crenos.unica.it/crenos/sites/default/files/wp/99-6.pdf>

9. Lee, D., & Zhang, H. (2019). *Export diversification in low-income countries and small states: do country size and income level matter?* (Working Paper No. 2019/118). International Monetary Fund. <https://www.imf.org/en/Publications/WP/Issues/2019/05/24/Export-Diversification-in-Low-Income-Countries-and-Small-States-Do-Country-Size-and-Income-46907>

10. Panahi, H. (2010) Size of a country, openness and the economic growth. *World Academy of Science, Engineering and Technology*, 66, 699–705. https://www.researchgate.net/profile/Prof-Hossein-Panahi/publication/288247133_Size_of_a_country_openness_and_the_economic_growth/links/5f3172e3299bf13404b59623/Size-of-a-country-openness-and-the-economic-growth.pdf

11. Perkins, D., & Syrquin M. (1989). Large countries: the influence of size. In Chenery, H., & Srinivasan, T. N. (Eds.) *Handbook of development economics* (Vol 2, pp. 1691–1753). Elsevier Science. <https://www.sciencedirect.com/science/article/abs/pii/S157344718902019X>

12. Perry, M. (2001). Shared trust in small countries. The limits to borrowing model. *New Economy*, 8(3), 175–177. <https://zh.art1lib.com/dl/8976489/7fc140>

13. Tiits, M. (2007). Technology-intensive FDI and economic development in a small country – the case of Estonia. *Trames*, 11(3), 324–342. https://www.ibs.ee/wp-content/uploads/trames_2007_3_6___IBS_WP_1_2005.pdf

14. UNCTADStat (2022). *Data center*. <http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx>

15. Vujakovic, P. (2009). *How to measure globalisation? A new globalisation index (NGI)* (Working paper No. 343). Österreichisches Institut für Wirtschaftsforschung. https://www.wifo.ac.at/jart/prj3/wifo/resources/person_dokument/person_dokument.jart?publikationsid=36681&mime_type=application/pdf

16. World Bank (2021, December 16). World development indicators. <http://data.worldbank.org/data-catalog/world-development-indicators>